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A RARE AMERICAN SHRUB

ELLIOTTIA RACEMOSA is a rare American shrub or small tree indigenous to a restricted area in eastern and southern Georgia. Because of its rarity, the reference literature is rather meager. Unfortunately, in the little which has been published there appear some misstatements concerning its normal habitat and method of reproduction. The purpose of these notes is to clarify these points. During the past several years the author has had the species under observation at a number of stations. In the course of this study, he has been accompanied on many of his trips by Frank M. Crayton, a nurseryman and plant collector of Biltmore, North Carolina, who is entitled to share any credit that may accrue from these investigations. Acknowledgements are also due Mr. C. D. Beadle of Biltmore, who was a member of a recent expedition and with whose assistance a more thorough study of the plant's method of reproduction was made than had been undertaken up to that time.

Elliottia racemosa is an attractive plant even when not in flower and when in bloom, few native American shrubs can approach it in beauty. Its flowers are pure white, usually with four linear-elliptic petals that are markedly recurved. The racemes, which are always terminal on leafy, fastigiate branches, are rather long, averaging well over six inches. There are several illustrations in the literature but few of these do the plant justice.

The line drawing in Bailey's *Cyclopedia of Horticulture* is good enough in so far as the structure of the flower is concerned, but it fails to give a true picture of the plant in blossom. The petals are actually much more recurved and the racemes much more densely flowered than this illustration indicates. Plants of average size, up to six feet or more in height, bear from three to more than twenty racemes and one of the profusely flowered specimens presents an impressive sight indeed. If it were hardy in the north and were readily propagated, *Elliottia* would undoubtedly be one of our most popular shrubs. Unfortunately, its hardiness is questionable and its rarity would make general transplanting out of the question even if it were hardy. It cannot readily be transplanted even in the area where is is native. This is evidenced by the fact that of four specimens that were transplanted from a large station to gardens within two miles during the past three years two promptly died and the remaining two are not thriving well.

While *Elliottia* is one of our rarest shrubs, there is a general impression that it is either nearly extinct or promises soon to become so. This impression can be attributed, in some measure at least, to published statements that are somewhat at variance with the facts.

Investigations indicate that while the plant unquestionably is rare and seems to have disappeared from some areas where it was formerly known to occur there is no occasion to consider it to be in danger of extinction. Also at some stations it appears that there has been no reproduction for many years. However, there are stations where it is propagating itself by seed so that it is definitely not sterile to its own pollen.

At various times during the past several years the author has taken up a number of plants in eastern Georgia. In each case the roots were followed to their very ends and no evidence was found to show that the plant multiplies from its rootstock. In common with many other ericaceous plants, it has shallow horizontal roots that are long and heavy, but, except for rather young plants, they are usually noticeably free from the small fibrous rootlets that are so abundant on the roots of many plants in this family. It does reproduce itself by seed, but to what extent it produces viable seed and whether some such seed is produced annually or only during occasional years is not yet determined. During the past several years it has flowered profusely, but, while the flowers seem to be setting seed as they pass maturity, the vast majority of the fruits abort.

In the fall of 1936 a check of one plant which bore twenty-three flower racemes that averaged over forty flowers each (a total of approximately 1000 individual flowers) showed only eight capsules and not one of these contained a viable seed! Most of the plants that year failed to produce a single fruit. The racemes average fully forty flowers each (more than 80 have been counted on some of them), yet in 1936 a total of only twenty-eight seed capsules were produced by approximately four hundred racemes; and no seed germination has been reported from any of the material distributed. Seeds were sent to Kew, the Arnold Arboretum, and several individuals in the United States. At several stations no very young plants are in evidence, but in two places at least a fair number of small seedlings less than eight inches high were observed, proof that the plant has produced viable seed within the past few years. Several of these small specimens were lifted, the soil sifted from about their roots, showing no connection with other plants.

Elliottia seems normally to grow with a single trunk, similar to a small tree. However, the area in which it is native is subject to periodical burnings, and if a plant is killed by fire a cluster of sprouts usually arises from the base of the stump. At several stations, as a consequence of this burning, there are whole groups of plants that are of a bushy character. At one large station the plants are mostly of this type, the single-stemmed ones being largely confined to the outer and wetter edges of the area where fire never reaches them. At another station the plants occur at scattering intervals for several hundred yards along the edge of a swamp. Fire seldom, if ever, reaches them, and here they are almost entirely of the "tree" type.

There are several stations in one county in eastern Georgia. All of them that have been investigated are in soil known as Norfolk sand. A survey of the area made by the Bureau of soils, U. S. Department of Agriculture, gives the following information:

"The surface soil of Norfolk sand, to a depth of 6 or 8 inches, consists of loose sand of light gray to dark gray color, changing to light yellowish, the surface being darkened for a few inches by the accumulation of a small amount of organic matter.—The subsoil is of material similar to the soil, in fact there is practically no line of demarcation between soil and subsoil. The subsoil extends to a depth of over 36 inches.—Generally (it) is several feet in depth, in places being as much as 20 feet or more.—The particles forming the sand are subangular grains of quartz, no other material seeming to enter into its formation."

A mechanical analysis given in this survey is as follows:

Fine gravel	2.2%
Coarse sand	19.5%
Medium sand	20.8%
Fine sand	39.9%
Very fine sand	8.6%
Silt	6.0%
Clay	2.5%

Samples of soil taken from about the roots of *Elliottia* at the largest station show a definite acid reaction ranging from pH 5.1 to pH 5.42.

Of the five stations in this neighborhood, three of them, including the largest one just mentioned, are all rather low. At the large one the immediate plant associates include the following:

Cyrilla racemiflora
Cliftonia monophylla
Kalmia hirsuta
Fothergilla sp.
Azalea 3 sp.
Hypericum fasciculatum
Vaccinium sp.
Liquidambar Styraciflua
Osmanthus americanus
Stewartia malacodendron (S. virginica)
Magnolia virginiana
Baccharis halimifolia
Wisteria frutescens
Symplocos tinctoria
Lyonia nitida (Pieris nitida)
Persea Borbonia

While some of the above species are occasionally found on higher and dryer land, most of them (with the exception of *Symplocos*) usually grow only in damp soil. Immediately adjacent to this station is a small area of perhaps half an acre, that is covered by a solid growth of *Hypericum fasciculatum.* Here the water table is practically at the ground level. At no time during the past three or four years has the author ever seen this area without some water showing at the surface. Where the *Elliottia* grows nearby, the ground level is at no point more than five feet higher than it is at this stand of *Hypericum*, and most of it is not more than three or four feet higher.

At this station is found the best evidence that the plant actually does reproduce itself by seed. Here there are many hundreds of plants ranging in size from seedlings seven or eight inches high, to mature plants up to eleven feet tall. Here also occurs the most profuse flowering seen during these investigations. Formerly there was a scattering growth of pines over this station but these were cut off some years ago and now the whole area is in open sunlight. This fact probably accounts for the profuse flowering. The station covers an irregular area ranging from 30 yards to almost 200 yards in width by a quarter of a mile in length.

Across a small stream from this station and about 200 yards away more plants are found. Most of them are scattered through a heavy growth of other shrubs and here are found the largest known specimens. There are three trees, all of which are above 20 feet in height, one of them being more than 30 feet tall and measuring five inches in trunk diameter, three feet from the ground. These trees are in ground that is fully as low-lying as that at the large station across the creek. Several smaller plants, some up to seven feet tall, grow on rising ground close by, but none of them under the typical "sand ridge"

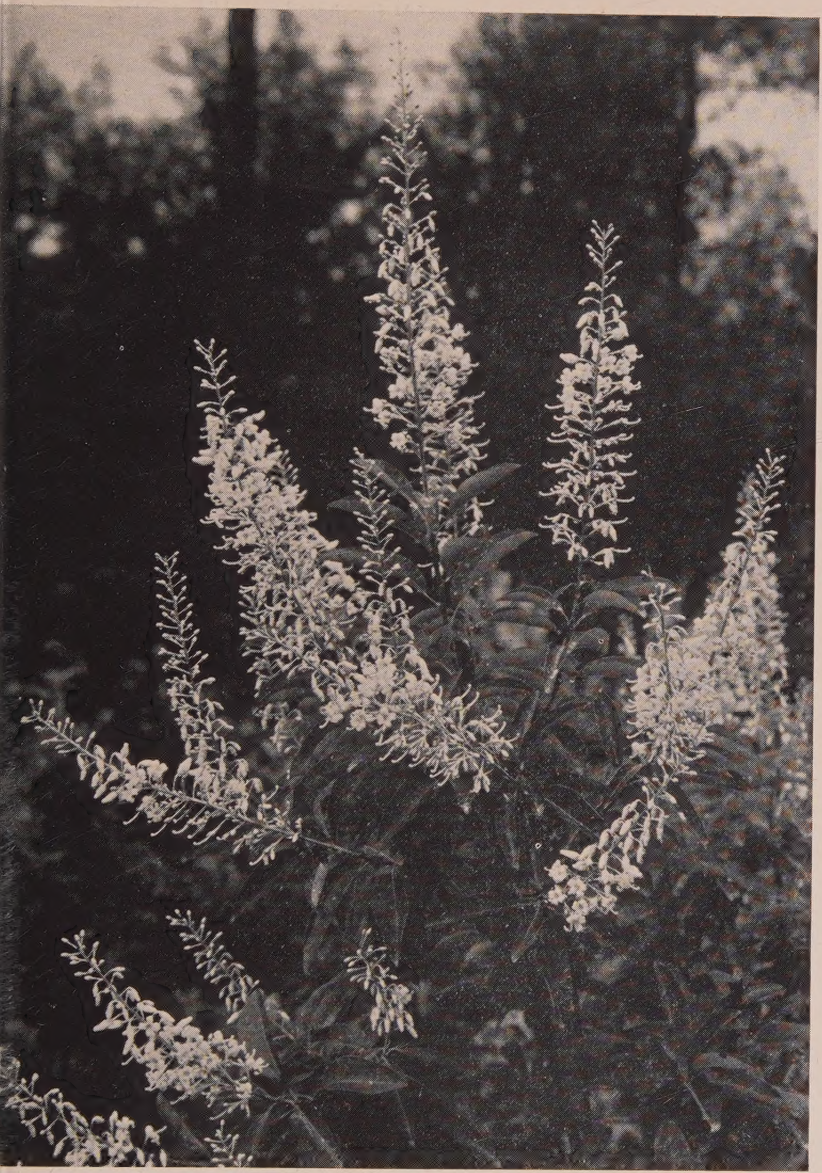

PLATE I

Elliottia racemosa, a rare American shrub, indigenous to a restricted area in eastern and southern Georgia.

conditions specified as the habitat for this plant by some botanists.

In south central Georgia and some 80 miles southwest of the large station the plant occurs again. Here it grows near the foot of a sloping sandy ridge, adjoining the swampy area along a small creek. The surface soil seems to be much the same as found at the other stations. While this station is higher and dryer than those in the eastern part of the state, nevertheless the soil must contain considerable moisture as the immediate plant associates include thrifty specimens of both *Cliftonia monophylla* and *Cyrilla racemiflora.* Typical plants of blackjack oak are found nearby, but all of them grow higher up the slope than does the *Elliottia.* There are hardly more than a dozen plants at this station. They range in height from about three to eight feet. There are no small plants and there is no evidence of reproduction.

In the National Herbarium at Washington are deposited specimens of *Elliottia* collected by R.M.Harper on September 22, 1903 bearing the notation ''very dry pine barrens north of Douglas, Coffee County, Georgia.'' Dr. Harper has informed the writer that he located this station many years ago and could hardly direct anyone to it now as the present roads probably do not follow the cart tracks of that time. As a consequence there has been no opportunity to check this station, for Dr. Harper is too reliable a collector for his information to be questioned, but it seems that while this plant is adapted to exclusively sandy soil it is somewhat indifferent as to moisture. However, the only stations where there is any evidence of reproduction itself are the lowest and dampest of them all.

In all the published descriptions of *Elliottia* that the author has seen which have appeared since Elliott's ''A Sketch of Botany of South Carolina and Georgia'' published in 1821, there occur some statements which are apparently erroneous. Most of the description given by Rehder in Bailey's *Cyclopedia* is correct, but he makes two statements to which the present writer cannot subscribe. He states ''propagation by suckers, which appear only occasionally.'' Exception is taken to this for the reasons given above. Again he states ''racemes—often branched at the base.'' The author has seen literally thousands of racemes, but he has yet to see one that branched either at the base or elsewhere.* If there exists any herbarium specimen with a branch-

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*The description of the racemes as ''often branched at the base'' may be easily misunderstood, and therefore I have changed it in my *Manual of Trees and Shrubs* (p. 678) to ''pedicels slender, 6-12 mm. long, the lower ones sometimes branched,'' which is more correct since it is not the axis of the raceme itself but the lower pedicels which are branched, so that the raceme becomes a panicle. It may be added that it would be more accurate to replace ''sometimes branched'' by ''often branched'' or even ''usually branched.'' Alfred Rehder ing raceme, this description should read "occasionally" instead of "often."

Small, in his *Manual* states "flowers—in short panicles." A better description would read "elongated" instead of "short," for the reason given earlier in this article. Again he states "calyx-lobes 3 or 4." In the several years this plant has been under observation neither a three-parted flower nor a three-parted capsule has been seen. A preferable statement would be "perianth segments usually four but frequently five." Until this year the author would have written "occasionally" instead of "frequently", but in June, 1937, several hours were spent in photographing the plants in flower, and while engaged in this a number of plants were noted on which many of the flowers had their parts in fives. While collecting seed in the fall, a fairly large group of plants was noted on which a majority of the seed capsules were five-parted.

There is a Government Weather Bureau station not far from the largest *Elliottia* station, the altitude at both places being slightly under 200 feet above sea level. The station records cover the past thirty-nine years and show an average annual minimum temperature of 54.7 degrees Fahrenheit, the average minimum for the three winter months being 39.6 degrees. Record "lows" during the 39 years were December (8° above zero); January (12° above zero); and February (2° above zero). Precipitation averaged 49.04 inches annually.

Efforts to transplant *Elliottia* at Biltmore, North Carolina, have not been entirely successful. About four years ago six plants were brought in, four of which are still living. One succumbed in 1936, possibly as a result of the heavy freeze in March of that year, and another died the same year, but as it had some protection the heavy soil in which it was planted probably was the cause of its death rather than the low temperature. The other four plants are still living and appear to be a little thriftier as each year passes. One of them has even developed an occasional flower. It is hoped that they will eventually become acclimated and thrive. Evidently the plant will withstand fairly low temperatures if given proper soil conditions, a very sandy loam with a definite acid reaction.

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A Tribute to an Eminent Botanist

Forty years ago this month the Arnold Arboretum welcomed from Germany, Alfred Rehder, a man who is today one of the foremost botanists of America. In 1883 Professor Alfred Rehder began writing articles on dendrological subjects for German periodicals, in 1895 becoming associate editor of *Mollers Deutsche gartner-zeitung*. In 1898, wishing to visit the Arnold Arboretum, whose fame was well known in Europe. Professor Rehder made arrangements with Professor C.S. Sargent, then Director, for one-half year as student-worker for $1.00 a day while at the same time carrying on his editorial work for the German periodical.

It was not long before his accurate knowledge and painstaking care were recognized and when Dr. L. H. Bailey, who was compiling the *Cyclopedia of Horticulture*, asked Mr. C. E. Faxon, Assistant Director of the Arnold Arboretum, to make drawings for this work, Mr. Faxon not wishing to undertake it recommended Mr. Rehder. Mr. Rehder did a few drawings, then sent an article on Aesculus, telling Dr. Bailey that drawing was not his forte but that he would be willing to write on dendrological subjects. Whereupon Dr. Bailey engaged him to write all the dendrological articles for the *Cyclopedia*, a work of several years.

Meanwhile in 1900 an extensive work had been undertaken by the Arboretum, the *Bradley Bibliography*, a guide to the literature of the woody plants of the world published before the beginning of the twentieth century. This work was not progressing satisfactorily and in 1901 it was entrusted to Mr. Rehder who spent seventeen years of exacting and concientious labor upon it, traveling in this country and in Europe visiting the important libraries, examing untold masses of material and gleaning for his Bibliography 100,000 titles.

Upon the return of E. H. Wilson from China, Mr. Rehder cooperated extensively in the preparation of *Plantae Wilsoniae*, edited by Professor Sargent. Of inestimable value to horticulturists, botanists and even to amateurs interested in growing plants is Mr. Rehder's *Manual of Cultivated Trees and Shrubs Hardy in North America.*

And so the half-year has lengthened to forty years of fruitful labor in his adopted land, and best wishes for the benefit of his continued service and helpful companionship are extended to this modest gentleman.